

**REMARKS**

The specification has been amended to recite the SEQ ID Numbers for the nucleic acid sequence of Genbank Accession No. X69822 and the amino acid sequence encoded thereby.

Claims 1, 2, 7 and 18 have also been amended to obviate the 35 U.S.C. §112, second paragraph rejection set forth in the present Official Action.

All of the foregoing amendments are presented to further clarify the scope of the invention and in no way represent acquiescence to the rejections made by the Examiner.

The April 11, 2003 Official Action and references cited therein have been carefully reviewed. In light of the amendments presented herewith and the following remarks, favorable reconsideration and allowance of the application are respectfully requested.

At the outset, the Examiner indicates at page 7 that claims 12, 16-18, 20-22, 29, and 30 are deemed free of the prior art. Notably, claim 2 has been rejected under 35 U.S.C. §112, second paragraph only. Accordingly, Applicants assume that claim 2 is also free of the prior art.

At page 3 of the Official Action, the Examiner maintains the rejection of claims 17 and 30 under 35 U.S.C. §112, first paragraph as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants again reiterate that the INRA clone of claims 17 and 30 is readily available to the public and further that this particular clone is not essential to the practice of the instant invention. Attached hereinwith, please find two references where clone INRa 717 1-B4 was used, Siebrecht et al. *Journal of experimental Botany* 1999;50(341):1797-1806 and Lapierre et al. *Plant Physiology* 1999;119:153-163. However,

in order to advance prosecution, these claims are cancelled in accordance with the present amendment.

At page 3, the Examiner indicates that claims 2, 7-12, 16-18, 20-22, and 29-30 remain rejected under 35 U.S.C. §112, second paragraph, for the reasons set forth in the Official Action of July 8, 2002. However, it is noted that the Examiner has stated that the previous rejection of claims 7, 12-27, 31, and 40 under 35 U.S.C. §112, second paragraph, has been withdrawn in view of Applicant's amendments. While the current Official Action provides a basis for the rejection of claims 2, 7, 11, 12, 18, 19, and 21 under 35 U.S.C. §112, second paragraph, the Action is silent regarding the grounds for the assertion that claims 8, 9, 10, 16, 17, 20, 22, 29, and 30 are lacking in clarity. Clarification is respectfully requested.

The Examiner has rejected claims 1 and 7 under 35 U.S.C. §102(e) as allegedly being anticipated by US Patent 5,955,651 to Corruzzi et al.

Claims 1 and 7-11 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Corruzzi et al. (U.S. Patent No. 5,955,651) in view of Canton F. et al. (Plant Molecular Biology, 1993, Vol. 22, pp.819-822) and Applicant's admission.

The foregoing constitutes the entirety of the objections and rejections raised in the April 11, 2003 Official Action. In light of the present amendments and the following remarks, each of the above-noted rejections under 35 U.S.C. §§ 112, first and second paragraphs, 102(e), and 103(a) is respectfully traversed.

#### **SEQUENCE LISTING**

A paper copy of the amended sequence listing in compliance with 37 C.F.R. §§1.821-1.825 is being submitted herewith providing sequence information for the nucleic acid sequence of Genbank Accession No. X69822 and the amino acid

sequence of the protein encoded thereby. Both the nucleic acid and amino acid sequences were provided when the skilled person accessed GenBank Accession number X69822 at the time the application was filed. Accordingly, Applicants submit that the provision of the nucleic acid and amino acid sequences in the attached sequence listing does not introduce new matter into the application. This statement provides the requisite evidence to support entry of the sequence into the application (see MPEP 608.01(p), which discusses the incorporation of essential material into the specification).

The sequence listing is being submitted in both paper copy and computer readable form under a separate cover in order to facilitate entry of the same into the application. Entry of the sequence listing is respectfully requested.

**CLAIMS 2, 7, 11, 12, 18, AND 21 AS AMENDED FULLY COMPLY  
WITH THE DEFINITIVENESS REQUIREMENT OF U.S.C. §112,  
SECOND PARAGRAPH**

It is the Examiner's position that the phrase "Genbank Accession No. X69822" renders claims 2 and 7 indefinite. Applicants disagree with the Examiner's assertion. However, in order to expedite prosecution, claims 2 and 7 have been amended to replace the phrase "Genbank Accession No. X69822" with "SEQ ID NO: 3". The cancellation of the b) clause from claim 7 renders the Examiner's rejection of this claim moot. The substitute sequence listing submitted herewith designates the nucleic acid provided in Genbank Accession No. X69822, as SEQ ID NO: 3. The amino acid sequence encoded thereby is designated as SEQ ID NO: 4. It is respectfully requested that the amendments to the specification inserting these sequence identifiers where appropriate be entered in the above-identified application.

The Examiner further rejects claim 7 asserting that the phrase "encodes a protein having enzymatic function" renders

the metes and bounds of the claim unclear. Claim 7 has been amended to recite that the sequence "encodes a protein having glutamate synthetase activity", which is clear and definite.

Applicants have also followed the Examiner's helpful suggestion made the following claim amendments: 1) The "the" has been replaced with an "a" in claim 11; 2) "said plant" has been replaced with "a plant" in claim 12; and 3) claim 18 has been amended to recite "wherein the transforming is by *Agrobacterium tumefaciens* mediated transformation".

The Examiner also asserts that claim 19 is improperly dependent. Inasmuch as claim 19 was canceled in the previous response, this rejection of claim 19 is moot.

Additionally, the Examiner maintains the rejection of claim 21 asserting that the phrase "a reproductive unit" is indefinite. Applicants hereby reiterate the position that "a reproductive unit" is clear and definite to those skilled in the art of plant biology. See U.S. Patent Nos. 5,861,542 and 6,194,167. In the '542 patent, a "reproductive unit" of a plant was defined as "any totipotent part or tissue of the plant from which one can obtain a progeny of the plant, including, for example, seeds, cuttings, buds, bulbs, somatic embryos, etc." In the '167 patent, the term "a reproductive unit" of a plant was similarly defined as "any totipotent part or tissue of the plant from which one can obtain a progeny of the plant, including, for example, seeds, cuttings, tubers, buds, bulbs, somatic embryos, cultured cells (e.g., callus or suspension cultures), etc." It is a well settled premise in patent law that "a patent need not teach, and preferably omits, what is well known in the art." Lindemann Maschinenfabrik v. American Hoist and Derrick, 221 USPQ 481, 489 (Fed. Cir. 1984). The skilled person readily appreciates that the phrase encompasses any unit from a plant from which progeny may be obtained. In light of all the foregoing, it is

clear that the metes and bounds of the phrase "reproductive unit" are clear to those skilled the relevant art.

In view of the forgoing remarks and the claim amendments, it is respectfully submitted that claims 2, 7, 11, 12, 18, and 21 as amended fully comply with the requirements set forth in 35 U.S.C. §112, second paragraph. Accordingly, withdrawal of the above-mentioned rejections is respectfully requested.

**CLAIMS 1 AND 7 AS AMENDED ARE NOT ANTICIPATED BY CORUZZI ET AL.**

The Examiner asserts that because Coruzzi et al. teach plant expression cassettes Z3 and Z17 comprising the pBIN vector with a 35S promoter operably linked to a pea glutamine synthetase (GS) cDNA having at least 70% sequence identity for both the protein and nucleic acid sequences provided in GenBank Accession number X69822, and a NOS terminator, this reference anticipates the subject matter of claims 1 and 7.

Applicants respectfully submit that claim 1 as amended is directed to plant expression cassettes comprising a GS coding sequence from gymnosperm. The GS used in the vectors of Coruzzi et al. is from pea, an angiosperm. Claim 7 has been amended to include a reference to SEQ ID NO: 3 which is isolated from gymnosperm. Inasmuch as Coruzzi et al. do not identically disclose each and every feature of the claims as amended, Applicants respectfully submit that the §102(e) rejection of claim 1 and 7 is improper and should be withdrawn.

**AMENDED CLAIMS 1 AND 7-11 ARE NOT UNPATENTABLE OVER CORUZZI ET AL. IN VIEW OF CANTON ET AL. AND APPLICANT'S ADDMISSION**

At page 7 of the Official Action, the Examiner states that "[i]t would have been *prima facie* obvious at the time of Applicant's invention to modify the expression cassette and *Agrobacterium* vector of Coruzzi to substitute the cDNA

encoding glutamine synthetase from *Pinus sylvestris* as taught by Canton for the nucleic acid from pea because the two nucleic acids are functionally equivalent in that they both encode glutamine synthetase". The Examiner further asserts that "[i]t would have been obvious to substitute one functional equivalent for another".

Applicants respectfully submit that the foregoing assertion is erroneous on its face.

It is well known in the art that GS from angiosperm and gymnosperm plants are biochemically and functionally distinct in their regulation and expression patterns. In angiosperm plants, e.g., pea, there are two major forms of GS: a cytosolic form expressed in roots and vascular tissues, such as GS1, and a plastid form expressed in photosynthetic tissues, such as GS2. In gymnosperm plants, e.g., pine, several GS1 genes have been characterized, but GS2, the plastid form observed in angiosperm plants, does not exist. Further GS1a from pine has features quite distinct from GS1 of angiosperm plants. For example, GS1a from pine is expressed in photosynthetic tissues and its expression is correlated with plastid development (Canovas et al., *Planta* 1991;185:372-378; Canton et al., *Plant Mol. Biol.* 1993;22:819-823; and Garcia-Gutierrez et al., *Plant J.* 1998;13:187-199). Neither of these features of pine GS1a is shared with other GS1 enzymes from angiosperm species, such as pea. Therefore, the GS enzymes from gymnosperm plants are not functionally equivalent to those from angiosperm plants, e.g., pea. Accordingly, claim 1 which is directed to a vector comprising a GS coding sequence from gymnosperm plants is not rendered obvious by the disclosure in Coruzzi et al., in view of Canton et al. and applicant's remarks.

Moreover, claim 7 has been amended to recite a glutamine synthetase coding sequence having the sequence of GenBank Sequence X69822, or a glutamine synthetase coding sequence

that is at least 70% identical to GenBank Sequence X69822, or a glutamine synthetase coding sequence that hybridizes to GenBank Sequence X69822 at moderate stringency. It is submitted that the pea GS coding sequence used in Coruzzi et al., GS1A (GenBank Accession No. M20663) and GS3A (GenBank Accession No. X04763) share only a 50.2% and a 61.9% similarity with GenBank Sequence X69822, respectively (See the nucleic acid sequence alignment attached hereto Exhibits A and B).

As mentioned above, the angiosperm or pea GS enzyme encoded by the vectors of Coruzzi et al. is NOT functionally equivalent to the gymnosperm or pine GS enzyme encoded by the sequences disclosed by Canton et al. It would, therefore, NOT have been obvious to substitute the pea GS coding sequence in the vectors of Coruzzi et al. with the pine GS coding sequence in Canton et al.

To establish a *prima facie* case of obviousness, three basic criteria must be met: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) there must be a reasonable expectation of success; and (3) the prior art reference (or references when combined) must teach or suggest all the claimed limitations (MPEP §2143). In the instant case, because the GS coding sequences disclosed by Coruzzi et al. and by Canton et al. are NOT functionally equivalent, there would have been NO motivation for one of ordinary skill in the art to combine the two references and to replace the pea GS coding sequence in Coruzzi et al. with the pine GS coding sequence in Canton et al. Further, no success would have been expected by one of ordinary skilled to combine the disclosure of Coruzzi et al. and Canton et al. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness.

Moreover, in *in re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) and *Ex parte Thumm*, 132 USPQ 66 (Bd. App. 1961), the court has established that the presence of a property not possessed by the prior art is evidence of nonobviousness. In the instant case, the claimed expression vectors comprise gymnosperm or pine GS coding sequences. These expression vectors possess properties not possessed by the expression vectors of Coruzzi et al., which comprise pea GS coding sequences. Specifically, as disclosed in the paragraphs begin at page 13, line 21, end at page 14, line 37 of the present application, when the instantly claimed vectors are transferred into angiosperm plants, the gymnosperm GS1 transcripts are correctly processed by the angiosperm translational machinery and the pine GS1 polypeptide is detectable both in leaf regions enriched in photosynthetic cells and in vascular elements. This unusual accumulation of the pine GS1 in photosynthetic tissues could not have been predicted from the normal accumulation of the endogenous angiosperm enzyme in vascular tissue only. Further, Coruzzi et al. have disclosed that when the expression vectors containing angiosperm GS coding sequences, GS3A or GS1A, are transferred into *Nicotiana tabacum* line SR1, only 6/13 or 5/8, respectively, of the transgenic plants demonstrate overexpression of GS activity (See column 26, lines 19-65 and column 27, lines 25-40 of Coruzzi). However, the transformation efficiency of the presently claimed vectors is unexpectedly higher, nearly 100%.

In summary, the requirements to establish a *prima facie* case of obviousness have not been met. Neither the cited references or the knowledge available to those skilled in the art teach or suggest any motivation to combine the teachings of Coruzzi et al. and Canton et al. Moreover, neither the references or the knowledge available to those skilled in the art provide any reasonable expectation of success in



substituting the pea GS coding sequences in the vectors of Coruzzi et al. with the pine GS coding sequences in Canton et al. Finally, the vectors of the present application possess unexpected properties over those disclosed in the prior art in that the present vectors possess higher transformation efficiency and that the transgenic plants containing the same have pine GS polypeptides present in photosynthetic cells. Accordingly, Applicants respectfully submit that the rejection of claims 1 and 7-11 under 35 U.S.C. §103(a) is untenable and should be withdrawn.

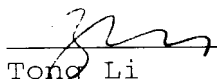
#### CONCLUSION

In view of the amendments and remarks presented herein, it is respectfully urged that the rejections set forth in the April 11, 2003 Official Action be withdrawn and that this application be passed to issue. In the event the Examiner is not persuaded as to the allowability of any claim, and it appears that any outstanding issues may be resolved through a telephone interview, the Examiner is requested to telephone the undersigned attorney at the phone number given below.

Respectfully submitted,

DANN, DORFMAN, HERRELL AND SKILLMAN  
A Professional Corporation

By

  
Tong Li

PTO Registration No. 47,748

Telephone: (215) 563-4100

Facsimile: (215) 563-4044

Enclosures: Exhibits A and B and references describing INRA Clone

## EXHIBIT A

**DNA Alignment of GS1a from *P. sylvestris* (GenBank Accession No. 69822) with GS1A from *P. sativum* (GenBank Accession No. M20663)**

Martinez/Needleman-Wunsch DNA Alignment

Minimum Match: 9; Gap Penalty: 1.10; Gap Length Penalty: 0.33

Seq1(1&gt;1423)

Seq2(1&gt;1434)

Similarity

Gap

Gap

Consensus

GS1a *P. sylvestris*GS1 *P. sativum* M20663

Index

Number

Length

Length

(1&gt;1423)

(44&gt;1429)

50.2

177

481

1645

				v10	v20	v30	v40	v50	v60							
GS1a <i>P. sylvestris</i>	T	CTC	T	TT TTT	T	CA	C A	T	CAGA CT TC							
									TC							
GS1 <i>P. sativum</i> M20663	T	CTC	T	TT TTT	T	CA	C A	T	CAGA CT TC							
		150		160	170	180	190	200	210							
				v70	v80	v90	v100	v110								
GS1a <i>P. sylvestris</i>	AACCTTGA	C	CT AG GA	AC A	GAGAA	TCAT GCAGA	TA ATATGGATTG									
GS1 <i>P. sativum</i> M20663	AACCTTGA	C	CT AG GA	AC A	GAGAA	TCAT GCAGA	TA ATATGGATTG									
	110		120	130	140	150	160	170								
				v120	v130	v140	v150	v160	v170							
GS1a <i>P. sylvestris</i>	G GG	GG	TGGA T TG G	GT	AAAGC	AG A CTCT TC	GGACC	GT A								
GS1 <i>P. sativum</i> M20663	G GG	GG	TGGA T TG G	GT	AAAGC	AG A CTCT TC	GGACC	GT A								
	160		170	180	190	200	210	220								
				v180	v190	v200	v210	v220								
GS1a <i>P. sylvestris</i>	T G C	TT A	GAGGT	CCCAA	TGGAA	TATGA	GG	TCCAGCAC	GGACA	GGTC						
GS1 <i>P. sativum</i> M20663	T G C	TT A	GAGGT	CCCAA	TGGAA	TATGA	GG	TCCAGCAC	GGACA	GGTC						
	220		230	240	250	260	270	280	290							
				v230	v240	v250	v260	v270	v280							
GS1a <i>P. sylvestris</i>	GGACA	GA	AG	GGAGT	AT	CT	TAT	CC	ACAAGC	AT	CT	G	GATCATT	C		
GS1 <i>P. sativum</i> M20663	GGACA	GA	AG	GGAGT	AT	CT	TAT	CC	ACAAGC	AT	CT	G	GATCATT	C		
	280		290	300	310	320	330	340	350	360	370	380	390			
				v290	v300	v310	v320	v330								
GS1a <i>P. sylvestris</i>	AGA	GG	AA	C	CAT	T	TTGGT	AT	TGGGATGG	TAC	TCCG	TGG	GA	C	C	
GS1 <i>P. sativum</i> M20663	AGA	GG	AA	C	CAT	T	TTGGT	AT	TGGGATGG	TAC	TCCG	TGG	GA	C	C	
	330		340	350	360	370	380	390	400	410	420	430	440	450		
				v340	v350	v360	v370	v380	v390							
GS1a <i>P. sylvestris</i>	ATTCC	C	C	AA	CAA	AG	C	GCAGC	GC	AA	TTTTTA	C	A	C	G	GT
GS1 <i>P. sativum</i> M20663	ATTCC	C	C	AA	CAA	AG	C	GCAGC	GC	AA	TTTTTA	C	A	C	G	GT
	390		400	410	420	430	440	450	460	470	480	490	500	510	520	
				v400	v410	v420	v430	v440								
GS1a <i>P. sylvestris</i>	T	GT	G	TGAAGA	ACATGGTA	GG	T	T	A	A	CA	GAATA	AC	CT	GTTGCA	AAA
GS1 <i>P. sativum</i> M20663	T	GT	G	TGAAGA	ACATGGTA	GG	T	T	A	A	CA	GAATA	AC	CT	GTTGCA	AAA
	440		450	460	470	480	490	500	510	520	530	540	550	560	570	580
				v450	v460	v470	v480	v490	v500							
GS1a <i>P. sylvestris</i>	G	AC	TCAA	TGGCCTCTGG	TGGCCA	TGGTGG	TA	CC	GG	CCTCAGGG	CCATA					
GS1 <i>P. sativum</i> M20663	G	AC	TCAA	TGGCCTCTGG	TGGCCA	TGGTGG	TA	CC	GG	CCTCAGGG	CCATA					
	500		510	520	530	540	550	560	570	580	590	600	610	620	630	640
				v510	v520	v530	v540	v550	v560							
GS1a <i>P. sylvestris</i>	TTA	C	TGT	GG	A	G	TT	GG	G	C	TG	ACAA				
GS1 <i>P. sativum</i> M20663	TTA	C	TGT	GG	A	G	TT	GG	G	C	TG	ACAA				
	550		560	570	580	590	600	610	620	630	640	650	660	670	680	690
				v540	v550	v560	v570	v580	v590							
GS1a <i>P. sylvestris</i>	AGCCTG	C	TT	TT	TGCC	GCC	AT	CA	A	CA						
GS1 <i>P. sativum</i> M20663	AGCCTG	C	TT	TT	TGCC	GCC	AT	CA	A	CA						
	700		710	720	730	740	750	760	770	780	790	800	810	820	830	840

GS1 P. sativum M20663 A3CCTG C TT TT TGCC GGC AT CA A CA  
 1616 1622 1630

GS1a P. sylvestris T CAGTGG ATCAATGGAGAAGTCATGCC GG CA TGGGAATTCAAGT GGTGC TC  
 1640 1650 1660 1670 1680 1690

GS1 P. sativum M20663 T CAGTGG ATCAATGGAGAAGTCATGCC GG CA TGGGAATTCAAGT GGTGC TC  
 1640 1650 1660 1670 1680 1690

GS1a P. sylvestris AGT GGTATCTC GC G GATGAG T TGG GT GCTCG T ATT TGGAGAGGAT A  
 1700 1710 1720 1730 1740 1750

GS1 P. sativum M20663 AGT GGTATCTC GC G GATGAG T TGG GT GCTCG T ATT TGGAGAGGAT A  
 1700 1710 1720 1730 1740 1750

GS1a P. sylvestris C CA G GC GGTGT GTTCT T CCTTTGA CCC AA CCAATT AGGG GACTGG  
 1760 1770 1780 1790 1800

GS1 P. sativum M20663 C CA G GC GGTGT GTTCT T CCTTTGA CCC AA CCAATT AGGG GACTGG  
 1760 1770 1780 1790 1800

GS1a P. sylvestris AATGGTCTGG TGC CACACAAA TACAGCACCAAGTC ATG G AAG A G G CG T  
 1810 1820 1830 1840 1850 1860

GS1 P. sativum M20663 AATGGTCTGG TGC CACACAAA TACAGCACCAAGTC ATG G AAG A G G CG T  
 1810 1820 1830 1840 1850 1860

GS1a P. sylvestris T GAA T AT AAGAAAGCAAT GA AA CT G AAG AGGC T G GAGCA  
 1870 1880 1890 1900 1910

GS1 P. sativum M20663 T GAA T AT AAGAAAGCAAT GA AA CT G AAG AGGC T G GAGCA  
 1870 1880 1890 1900 1910

GS1a P. sylvestris AT TC GC TATGG GA GG AA GAG G C G T AC GG G CACCA ACAGC  
 1920 1930 1940 1950 1960 1970

GS1 P. sativum M20663 AT TC GC TATGG GA GG AA GAG G C G T AC GG G CACCA ACAGC  
 1920 1930 1940 1950 1960 1970

GS1a P. sylvestris GACAT AATACCTT TC TGGGCTGTTTCAAA CGAGG GCTTC GTT G GT GG  
 1980 1990 1000 1010 1020 1030

GS1 P. sativum M20663 GACAT AATACCTT TC TGGGCTGTTTCAAA CGAGG GCTTC GTT G GT GG  
 1980 1990 1000 1010 1020 1030

GS1a P. sylvestris GACACAGA AAAGAAGG AA GGTATTTTGAGGAC A  
 1040 1050 1060 1070

GS1 P. sativum M20663 GACACAGA AAAGAAGG AA GGTATTTTGAGGAC A  
 1040 1050 1060 1070

GS1a P. sylvestris  
 1080 1090 1100 1110

GS1 P. sativum M20663

GS1a P. sylvestris GGAGGCCAGC TC T A  
 1120 1130 1140 1150 1160 1170

GS1 P. sativum M20663 GGAGGCCAGC TC T A  
 1120 1130 1140 1150 1160 1170

GS1a P. sylvestris A C T A ATA GT TGT A T T CCA TG TT AG AG T A C T  
 1180 1190 1200 1210 1220 1230

GS1 P. sativum M20663 A C T A ATA GT TGT A T T CCA TG TT AG AG T A C T  
 1180 1190 1200 1210 1220 1230

GS1a P. sylvestris CT T T G A ACC T AA CT TTG T C A AA AA TT T CT C  
 1240 1250 1260 1270

GS1 P. sativum M20663 CT T T G A ACC T AA CT TTG T C A AA AA TT T CT C  
 1240 1250 1260 1270

GS1a P. sylvestris  
 1280 1290 1300 1310

GS1 P. sativum M20663

GS1a P. sylvestris	TTG CAT TG A A T A A	T T TT TT T GT T	TTG T T G
GS1 P. sativum M20663	TTG CAT TG A A T A A	T T TT TT T GT T	TTG T T G
	^1190	^1200	^1210
	^1190	^1200	^1210
GS1a P. sylvestris	TTG T T T GG C A GGCTTT	G TCT TT T T AC C TT T T TT	
GS1 P. sativum M20663	TTG T T T GG C A GGCTTT	G TCT TT T T AC C TT T T TT	
	^1240	^1250	^1260
	^1240	^1250	^1260
	^1270	^1280	^1290
GS1a P. sylvestris	TT C C TTGT A T TAT T G CA AAT T A A TGT		
GS1 P. sativum M20663	TT C C TTGT A T TAT T G CA AAT T A A TGT		
	^1300	^1310	^1320
	^1300	^1310	^1320
	^1330	^1340	
GS1a P. sylvestris			
GS1 P. sativum M20663			
	^1350	^1360	^1370
	^1350	^1360	^1370
	^1380	^1390	^1400
GS1a P. sylvestris	TGAATATGA A T T T		
GS1 P. sativum M20663	TGAATATGA A T T T		
	^1410	^1420	
	^1410	^1420	

## EXHIBIT B

**DNA Alignment of GS1a from *P. sylvestris* (GenBank Accession No. 69822) with GS3A from *P. sativum* (GenBank Accession No. X04763)**

Martinez/Needleman-Wunsch DNA Alignment

Minimum Match: 9; Gap Penalty: 1.10; Gap Length Penalty: 0.33

Seq1(1>1423) GS1a <i>P. sylvestris</i>	Seq2(1>1373) X04763 GS3A <i>P. sativum</i>	Similarity Index	Gap Number	Gap Length	Consensus Length
(193>1293) (1>1423)	(219>1206) (27>1336)	61.9 58.4	96 96	217 217	1153 1475
v70 v80 v90 v100 v20 v30 v40 v50 v60					
GS1a <i>P. sylvestris</i>					
T C T T T T T T	T CAT G A T CAGA CT TCAA TT A CT GA ACAGA AAG T A				
TTGC G					
v170 v180 v190 v200 v110 v120 v130 v140 v150 v160					
GS1a <i>P. sylvestris</i>					
A TA ATATGG TTGG GGATCAGG AT GA AT G AG AAAGCCAG CTCT C GGACC GTGAGT C T A A CTTC AA TG					
GAACTA					
v270 v280 v290 v300 v310 v320 v330 v340 v350					
GS1a <i>P. sylvestris</i>					
CA GC C AGGA A GA AG GAAGT ATT TATATCCACAAGCTAT TTC G GA CCATT C G AGAGG AA A					
v360 v370 v380 v390 v400 v410 v420 v430 v440					
GS1a <i>P. sylvestris</i>					
C TGC GC C AAAATTTT A AC					
v450 v460 v470 v480 v490 v500 v510 v520 v530 v540					
GS1a <i>P. sylvestris</i>					
AAAG AC TCAA TGGCC CT GG TGGCC AT					
v550 v560 v570 v580 v590 v600 v610 v620 v630 v640					
GS1a <i>P. sylvestris</i>					
GA G TT G TG TGAAG AC ATGGTA GG TTGAACAAGA TATAC CT TT CA					

GS1a P. sylvestris

166193 TA CC GG CAGGG CCATATCA TGTGGA TTGG GCTGA AAAGC T GGACG GACATTGTTGATGC CATTAA AA GC  
TG CT

04763 GS3A P.sativum

166193 TA CC GG CAGGG CCATATCA TGTGGA TTGG GCTGA AAAGC T GGACG GACATTGTTGATGC CATTAA AA GC  
TG CT

580 590 600

510

520

530

540

550

560

570

v580

v590

v600

v610

v620

v630

v640

v650

v660

v670

GS1a P. sylvestris

T TT

C GG AT AA ATCAGTGGCATCAATGGAGA GT ATGCC GG CAGTGGGAATTTCAGT GG CC TC GT GGTATCTC GC G AGATGA  
G

04763 GS3A P.sativum

T

TT C GG AT AA ATCAGTGGCATCAATGGAGA GT ATGCC GG CAGTGGGAATTTCAGT GG CC TC GT GGTATCTC GC G AGA  
TGAG

680 690 700

610

620

630

640

650

660

670

680

690

v680

v690

v700

v710

v720

v730

v740

v750

v760

v770

GS1a P. sylvestris

T TGG G TGCTCGTT ATT T GAGAGATTACAGA A GC GG

GT T GTT T TC TTGGA CCCAA GCC ATT GGG GA TGGGAATGG

04763 GS3A P.sativum

T

TT TGG G TGCTCGTT ATT T GAGAGATTACAGA A GC GG GT T GTT T TC TTGGA

CCCAA GCC ATT GGG GA TGGGAATGG

780 790 800

710

720

730

740

750

760

770

780

790

v780

v790

v800

v810

v820

v830

v840

v850

v860

GS1a P. sylvestris

GCTGGG GC CA CAAATT CAGCACCAG TC ATG G

AA A GAGGGT CGA GTAAT AAGAA GC AT GAAAA CT G A TTGAGGCAT

04763 GS3A P.sativum

T

GCTGGG GC CA CAAATT CAGCACCAG TC ATG G AA

A GAGGGT CGA GTAAT AAGAA GC AT GAAAA CT G A TTGAGGCAT

880 890 900

810

820

830

840

850

860

870

880

890

v880

v890

v900

v910

v920

v930

v940

v950

GS1a P. sylvestris

AAGGA CA ATT C GC TATGG GA GGAAATGAGAGAG CTCAC

G A AC GA CA C T T TTC CT GGGGTG

04763 GS3A P.sativum

T

AAGGA CA ATT C GC TATGG GA GGAAATGAGAGAG CTCAC CGG A A A A G A

AC GA CA C T T TTC CT GGGGTG

960 970 980

890

900

910

920

930

940

950

950

960

970

v960

v970

v980

v990

v1000

v1010

v1020

v1030

v1040

v1050

GS1a P. sylvestris

T GAAAA CG GGA

CT CA TTAG GT GG G GACACAAAAAGA GAAAAAGTTA TTGAGGA T GA CCTGC TC AACATGGATC

04763 GS3A P.sativum

T

GAAAA CG GGA GCT

CA TTAG GT GG G GACACAAAAAGA GAAAAAGTTA TTGAGGA T GA CCTGC TC AACATGGATC

1060 1070 1080

990

1000

1010

1020

1030

1040

1050

1060

1070

1080

v1060

v1070

v1080

v1090

v1100

v1110

v1120

v1130

v1140

GS1a P. sylvestris

C TA T GTG

ACTTC ATGATTGCTGA AC ACCATTCT TGGAA AAA CA TG AG CCA AC AC C

C G T CTT

04763 GS3A P.sativum

C

TA T GTG

ACTTC ATGATTGCTGA AC ACCATTCT TGGAA AAA CA

TG AG CCA AC AC C C G T CTT

^1114                      ^1115                      ^1116                      ^1117                      ^1118  
 ^1119                      ^1120                      ^1121                      ^1122                      ^1123  
 ^1124                      ^1125                      ^1126  
 GS1a P. sylvestris                      TG  
 TTT A CCA C T AC G TA                      TAAT G A GT A                      ATGCCA T T  
 04763 GS3A P.sativum"                      TG                      TTT A CCA C T AC G TA                      TAAT G A GT A                      ATGCCA T T  
 ^1160                      ^1170                      ^1180                      ^1190  
 ^1250                      ^1260                      ^1270                      ^1280                      ^1290                      ^1300                      ^1310  
 ^1320                      ^1330                      ^1340  
 GS1a P. sylvestris                      TATATATAT T TT                      T                      T                      T                      T                      T                      A                      T  
 04763 GS3A P.sativum"                      TATATATAT T TT                      T                      T                      T                      T                      T                      A                      T  
 ^1200                      ^1210                      ^1220  
 ^1230                      ^1240                      ^1250                      ^1260  
 ^1350                      ^1360                      ^1370                      ^1380                      ^1390                      ^1400                      ^1410  
 ^1420  
 GS1a P. sylvestris                      A                      T                      A T G                      TT                      A A                      GT T                      AT TATT                      T  
 A T T                      T                      A                      T                      A T G                      TT                      A A                      GT T                      AT TATT                      T  
 04763 GS3A P.sativum"                      A                      T                      A T G                      TT                      A A                      GT T                      AT TATT                      T  
 A T T                      T                      A                      T                      A T G                      TT                      A A                      GT T                      AT TATT                      T  
 ^1270                      ^1280                      ^1290                      ^1300                      ^1310                      ^1320  
 ^1330